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(12) **United States Patent**
Wroblewski et al.

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(45) **Date of Patent: Aug. 30, 2016**

(54) **ROUGH-IN ADAPTER**

(71) Applicant: **Zurn Industries, LLC**, Erie, PA (US)

(72) Inventors: **Douglas R. Wroblewski**, Erie, PA (US); **Christopher A. Majocka**, Erie, PA (US); **William A. Verdecchia**, Erie, PA (US)

(73) Assignee: **Zurn Industries, LLC**, Milwaukee, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 239 days.

(21) Appl. No.: **14/067,036**

(22) Filed: **Oct. 30, 2013**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
E03F 5/04 (2006.01)

(52) **U.S. Cl.**
CPC ***E03F 5/0407*** (2013.01); *E03F 2005/0413* (2013.01); *Y10T 137/0402* (2015.04); *Y10T 137/598* (2015.04); *Y10T 137/6988* (2015.04)

(58) **Field of Classification Search**
CPC . F16L 5/00; E03F 5/0407; E03F 2005/0413; A47K 3/00; Y10T 137/6988
USPC 137/15.01, 15.09, 315.01, 362; 285/56–60; 4/679, 680
See application file for complete search history.

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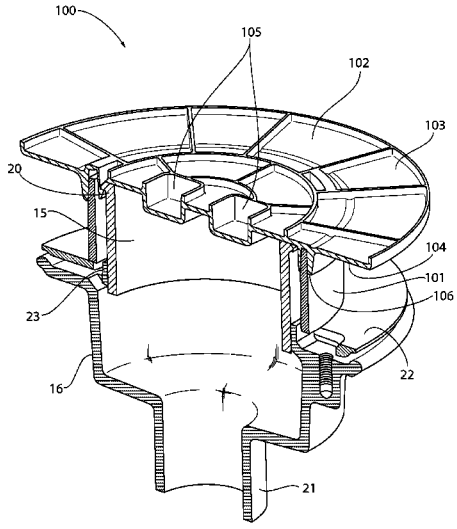
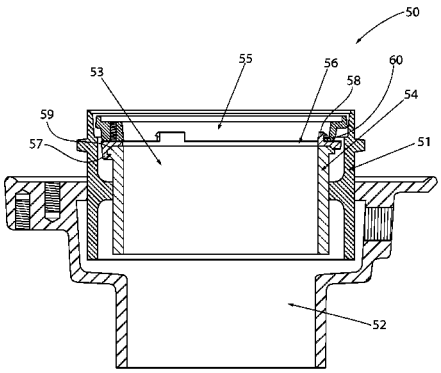
Primary Examiner — Kevin Murphy
Assistant Examiner — Jonathan Waddy
(74) *Attorney, Agent, or Firm* — Quarles & Brady LLP

(57) **ABSTRACT**

A drain assembly includes a drain body connected to a drain pipe such that the drain body is in fluid communication with the drain pipe; and a drain head assembly adjustably connected to the drain body such that the drain head assembly is in fluid communication with the drain body. The drain head assembly includes a shank adjustably connected to the drain body and a strainer assembly connected to the shank. The strainer assembly includes a strainer, an upper frame, and a lower frame connected to each other. The lower frame includes a connection feature that non-threadably and removably connects the strainer assembly to the shank. The drain assembly further includes a cover removably connected to the shank in a position over the shank and to at least partially define a void in a poured concrete slab around the shank.

15 Claims, 21 Drawing Sheets





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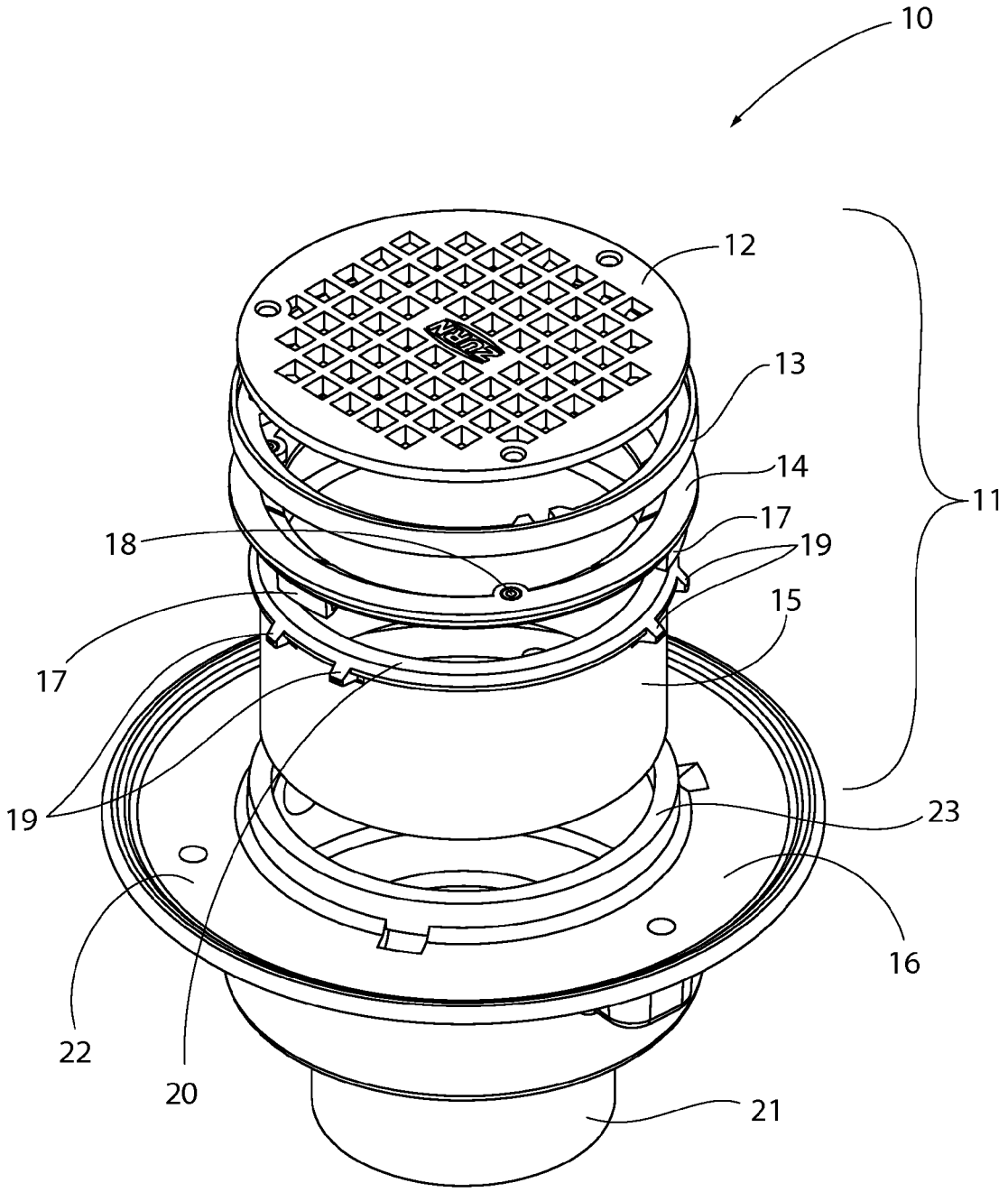

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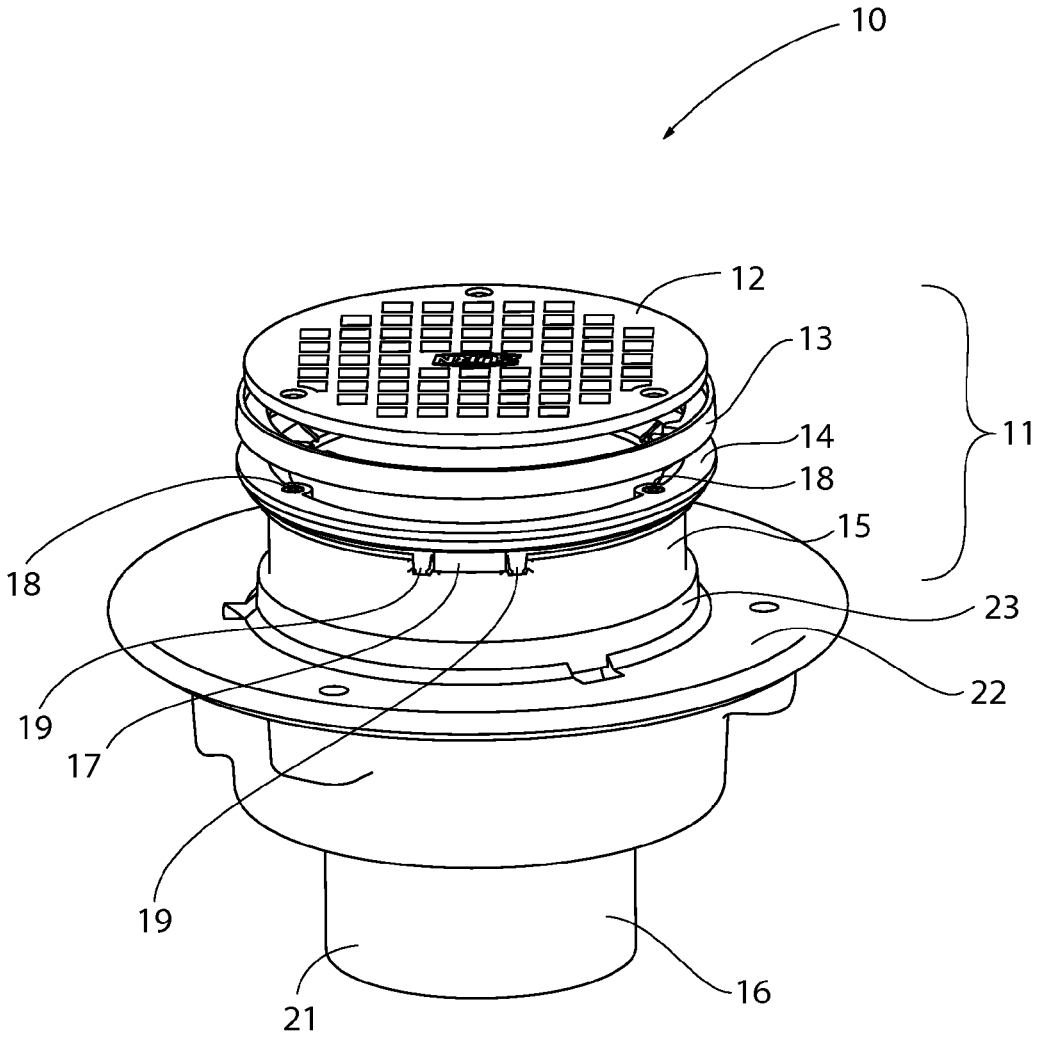

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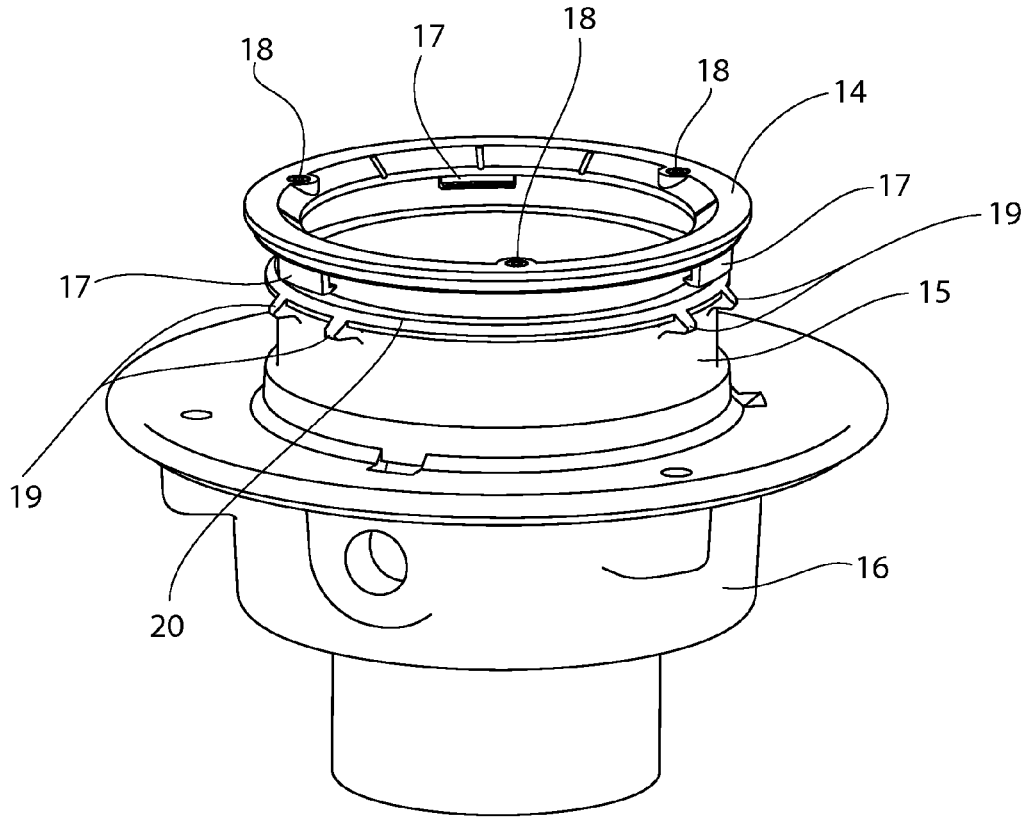

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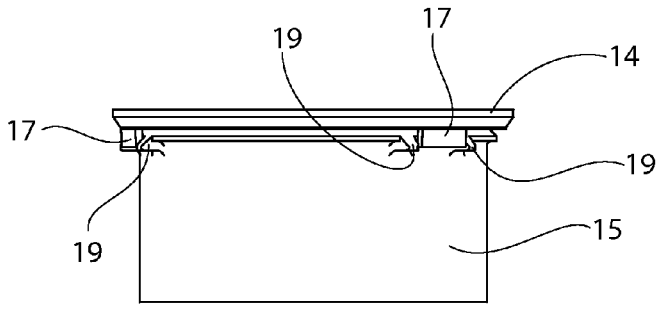
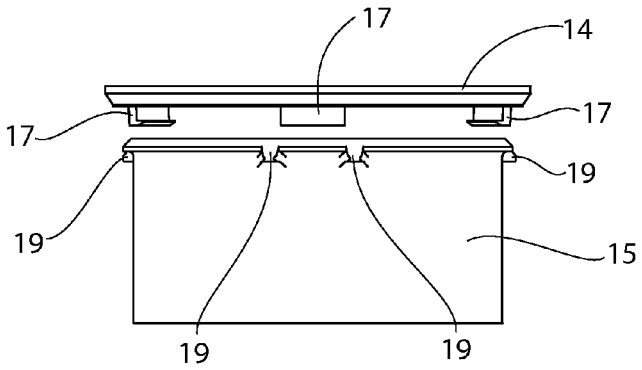


FIG. 4a



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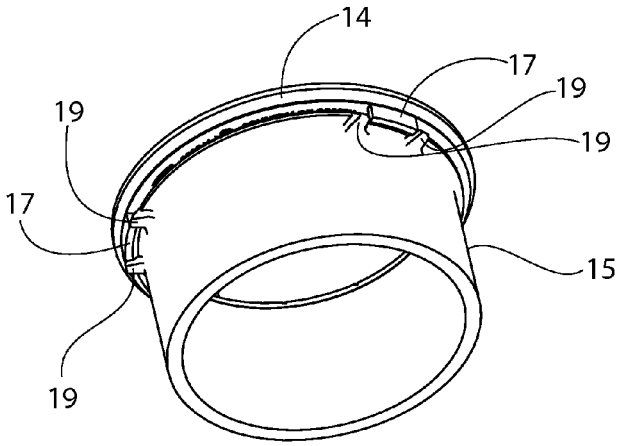

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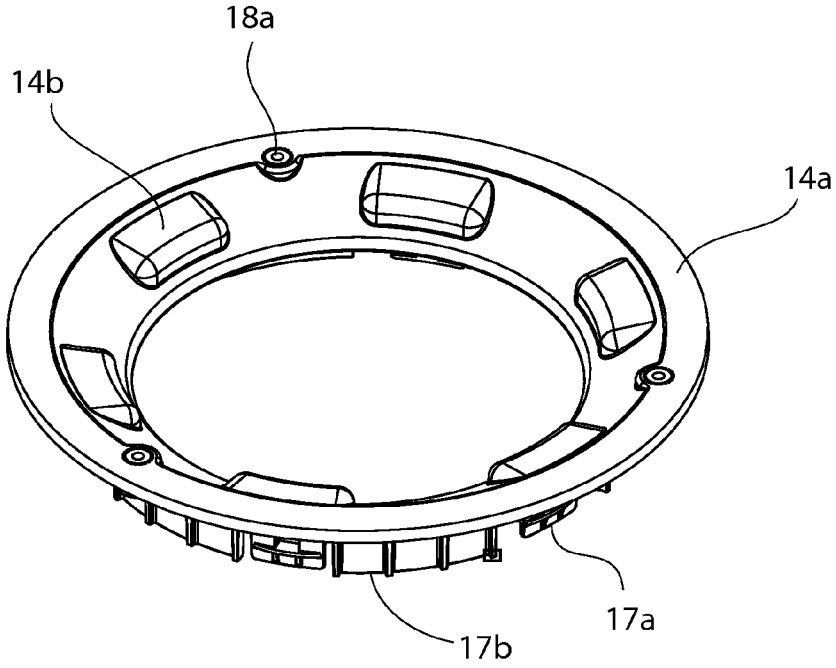

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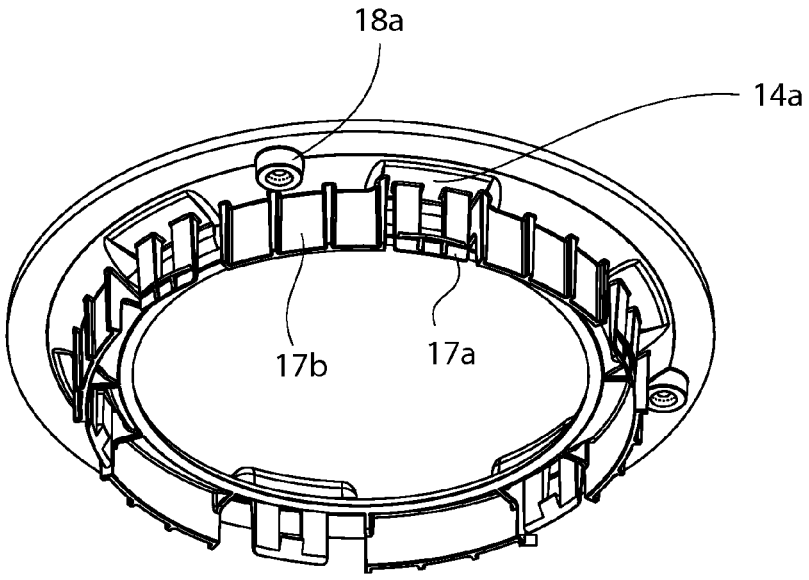

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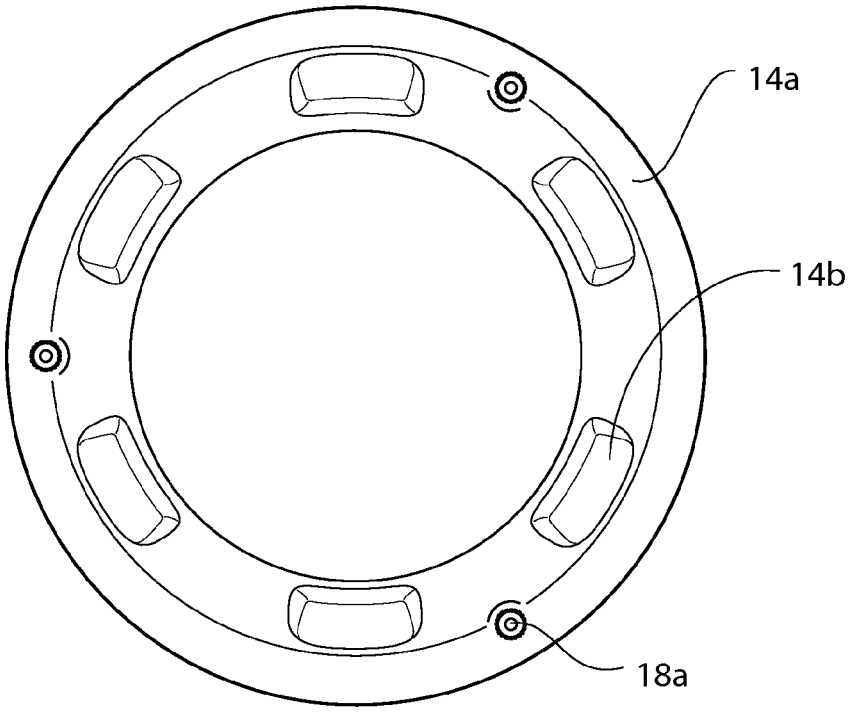

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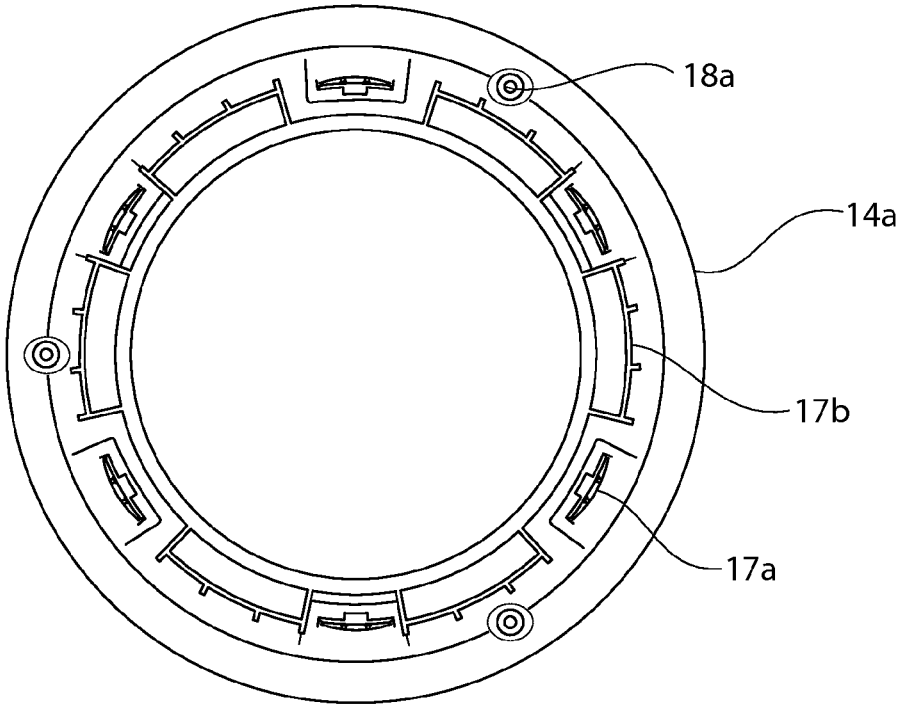

FIG. 4G

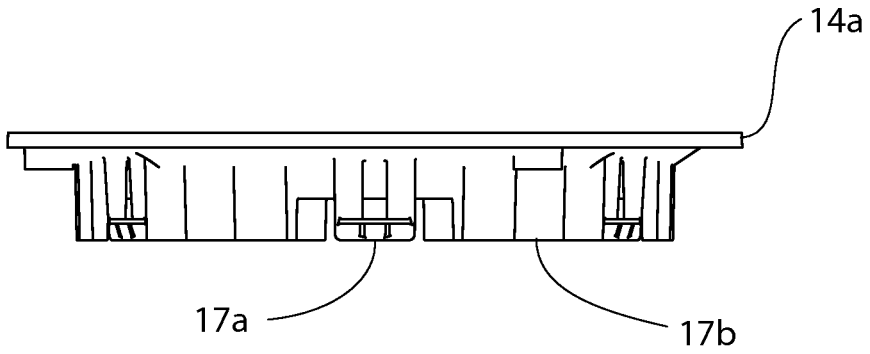

FIG. 4H

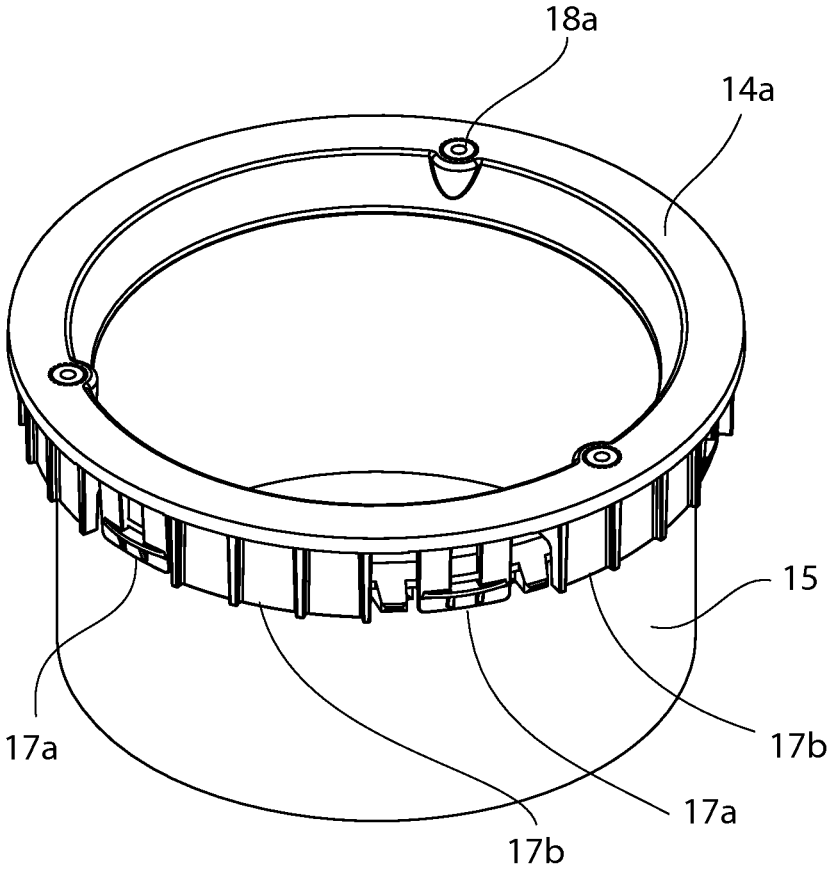

FIG. 4I

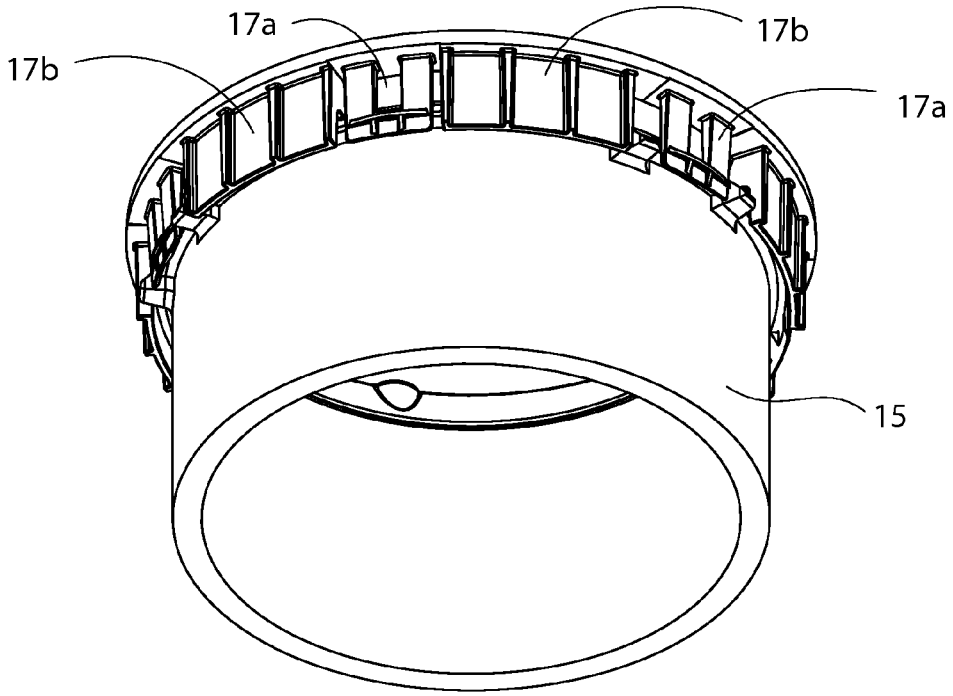

FIG. 4J

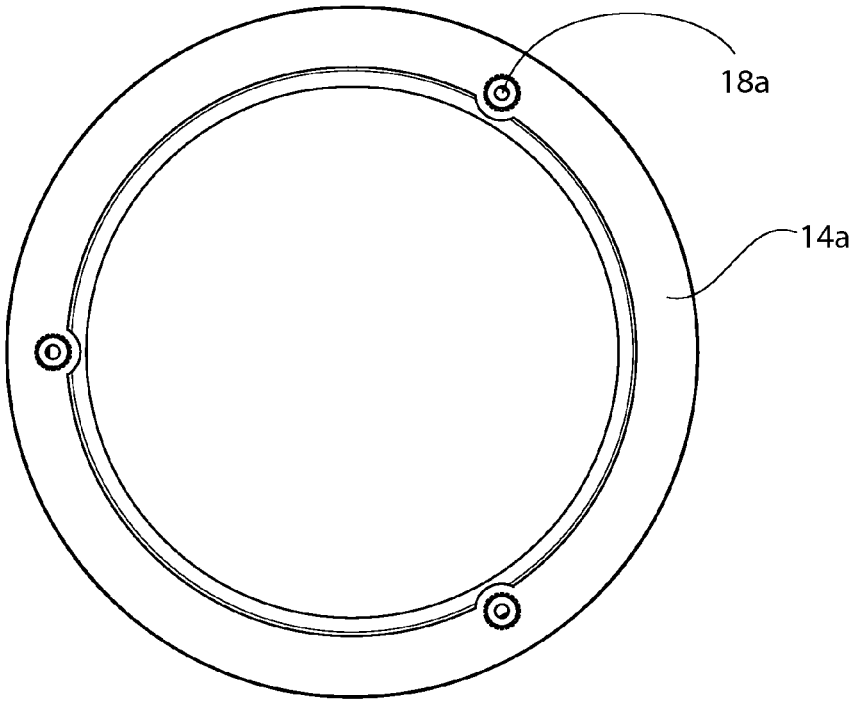

FIG. 4K

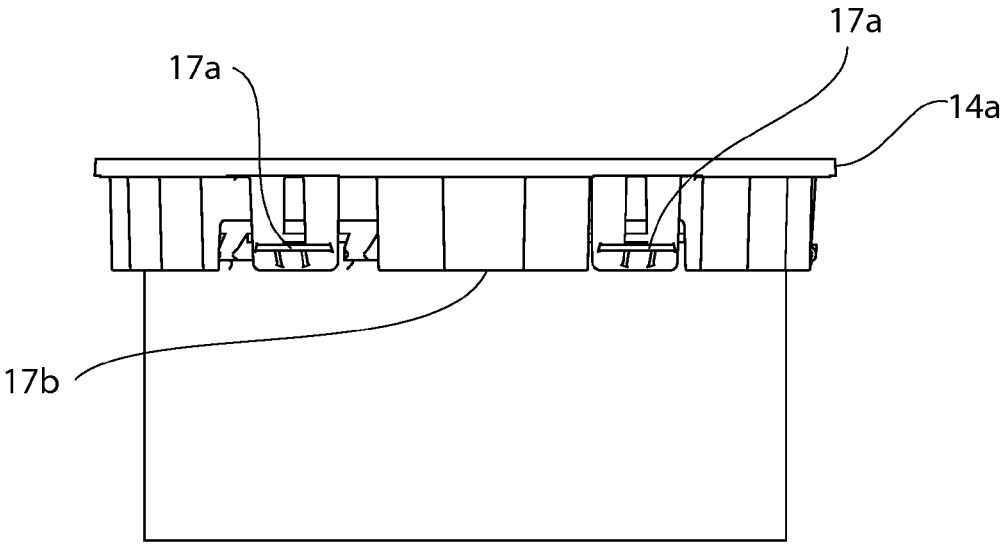

FIG. 4L

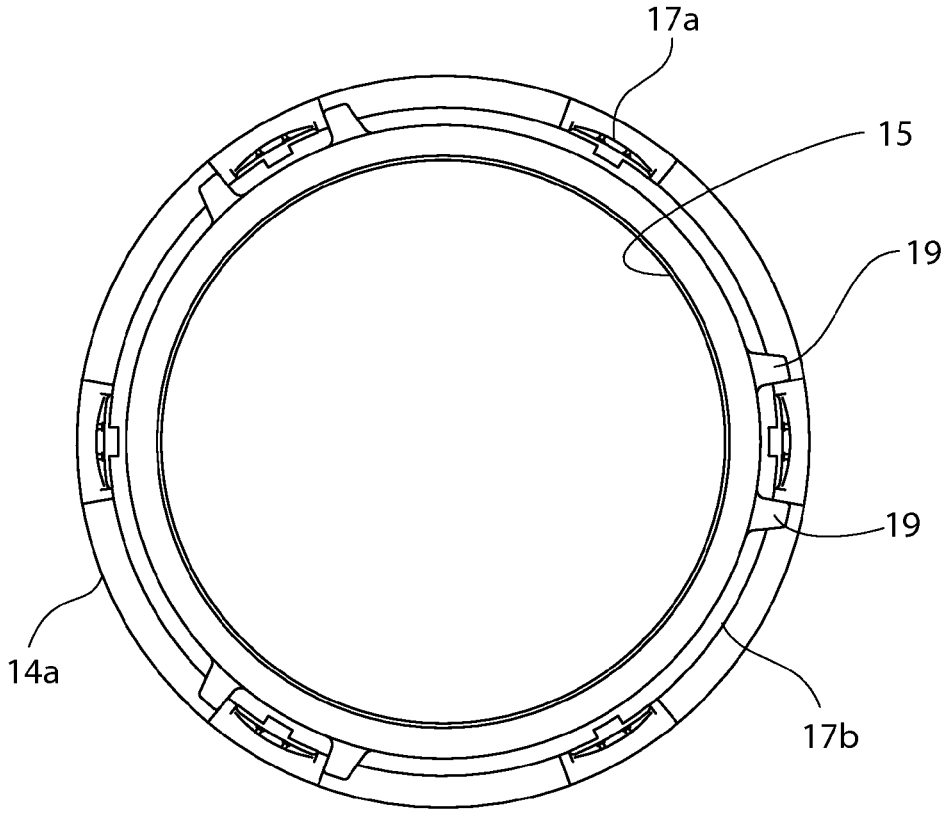

FIG. 4M

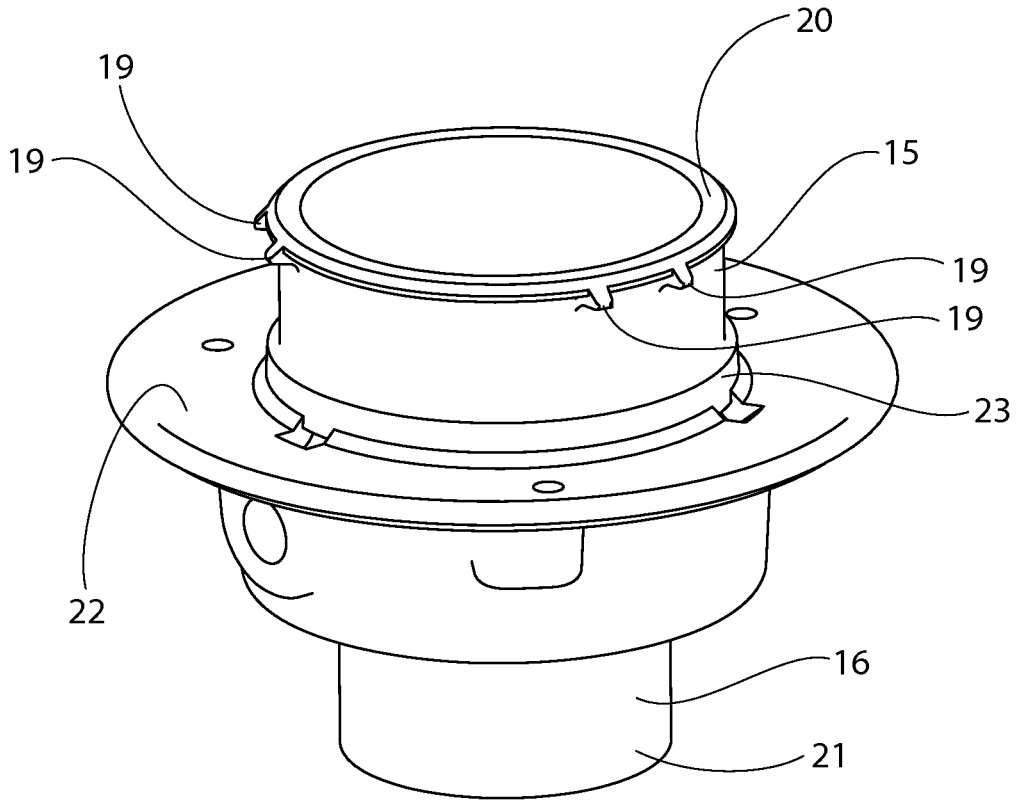

FIG. 5

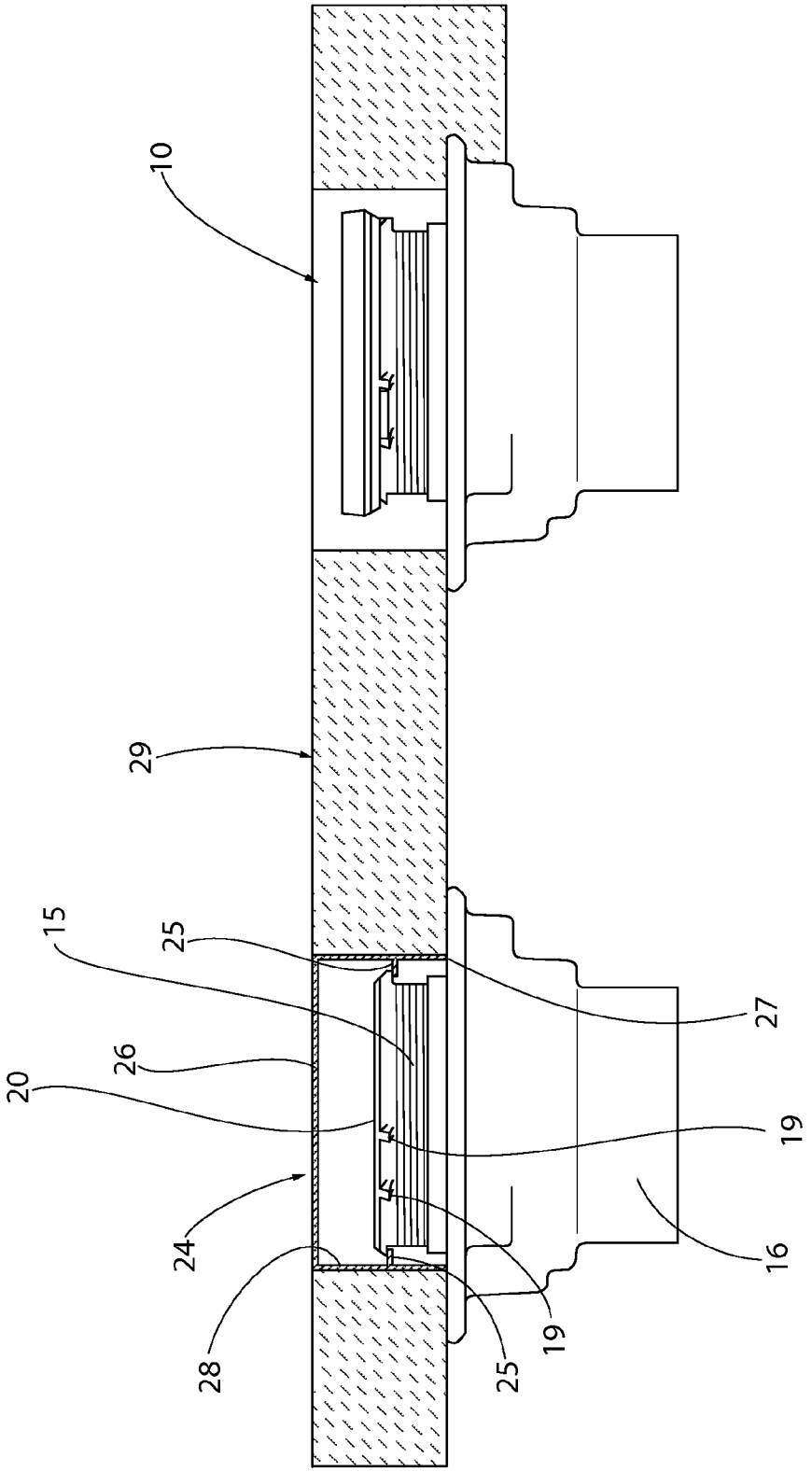

FIG. 6

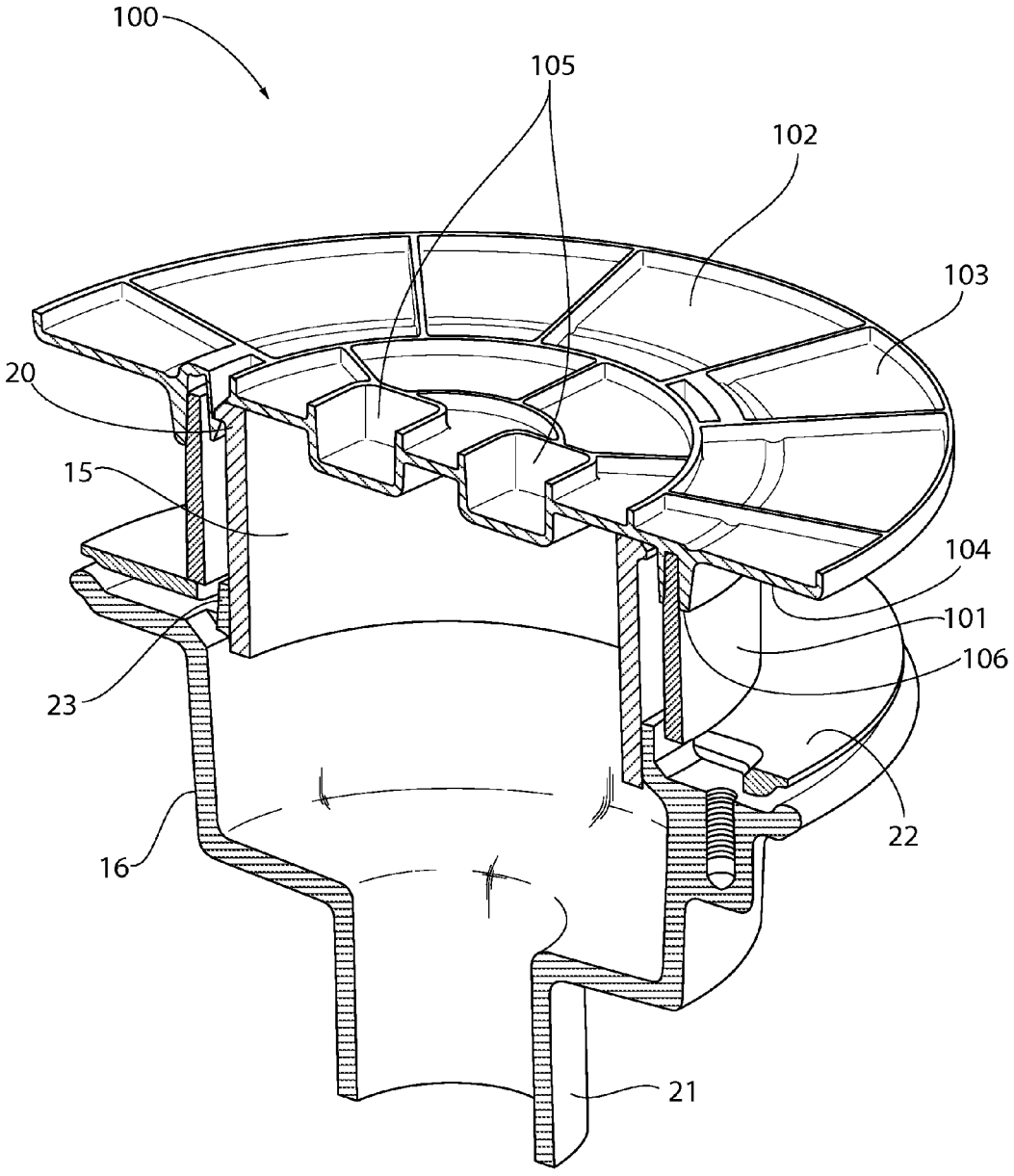

FIG. 7

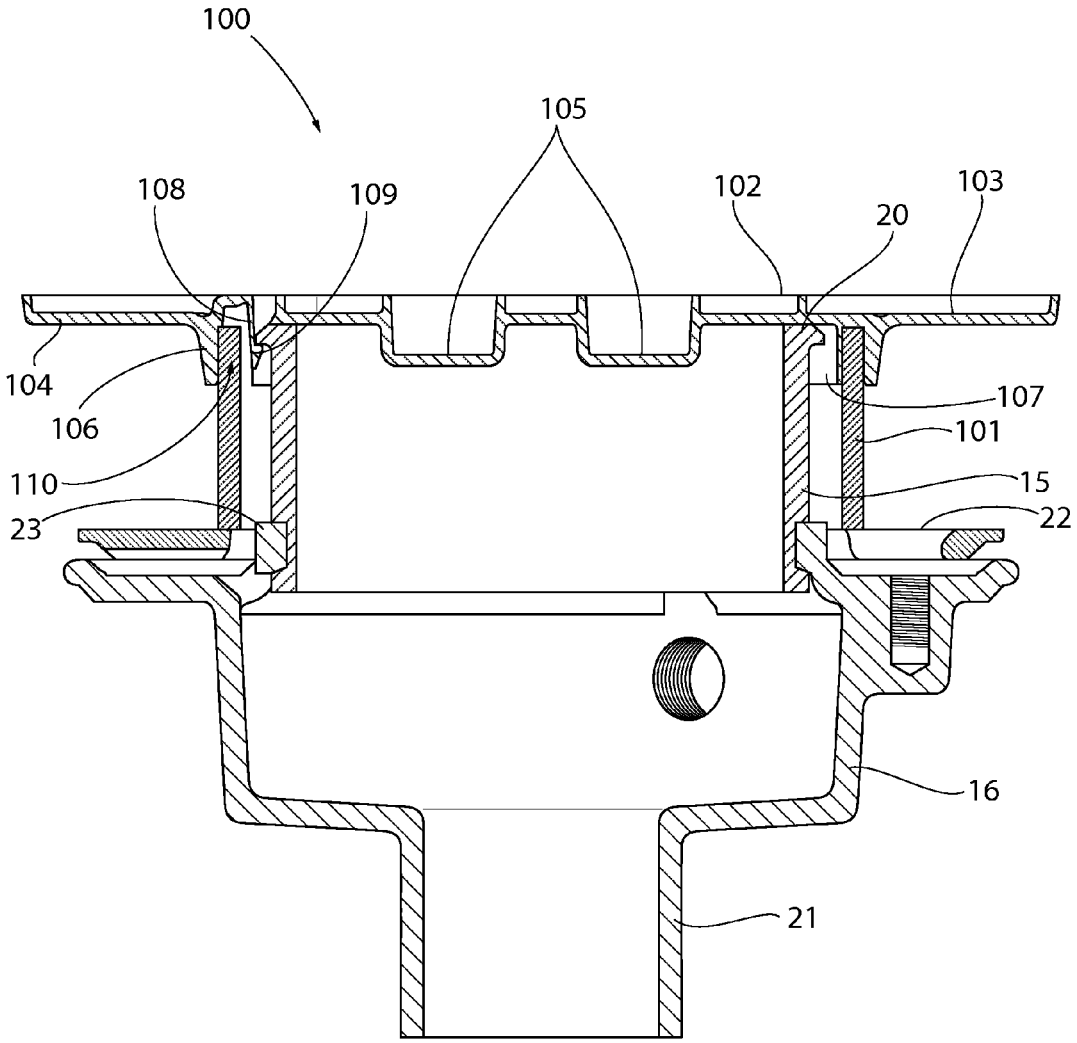

FIG. 8

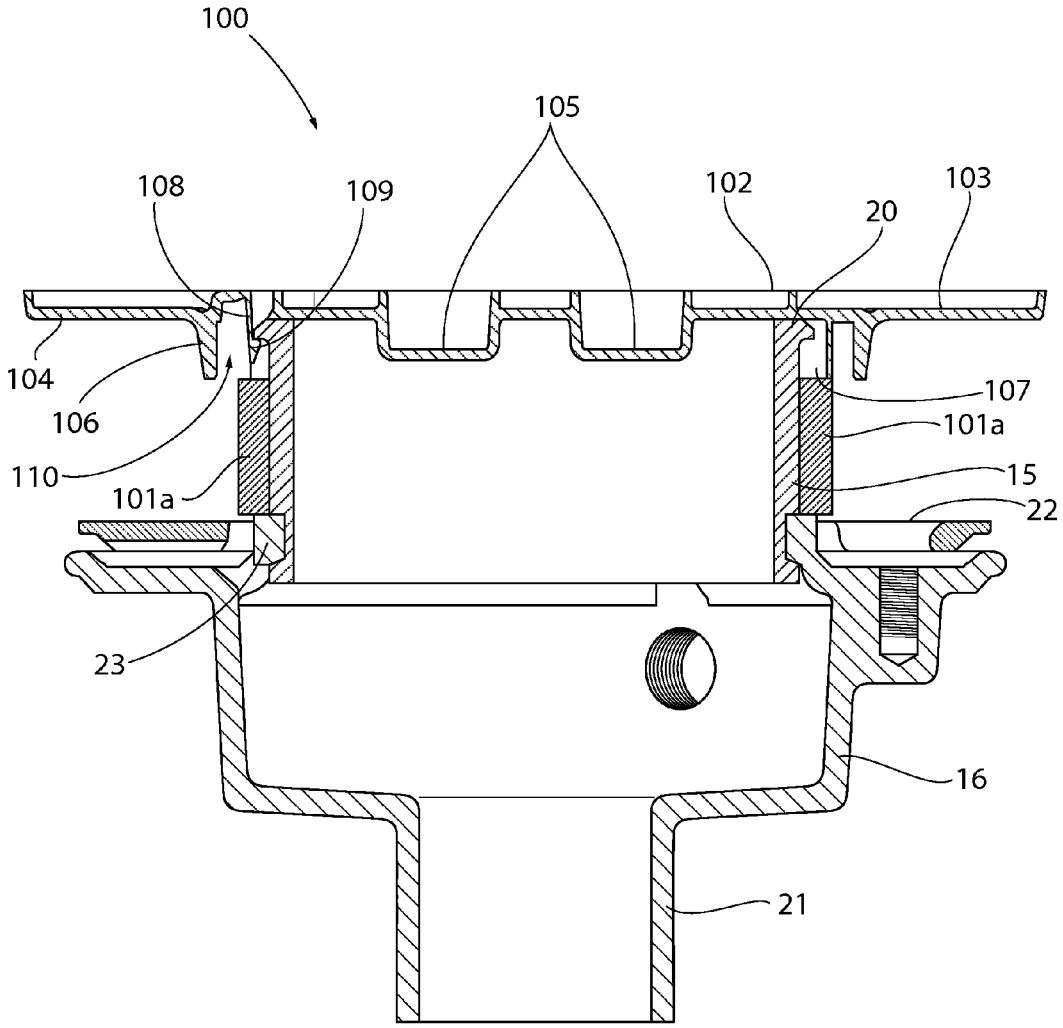
100
105
108
109
102
20
103
104
106
107
101a
110
15
101a
22
23
16
21

FIG. 8A

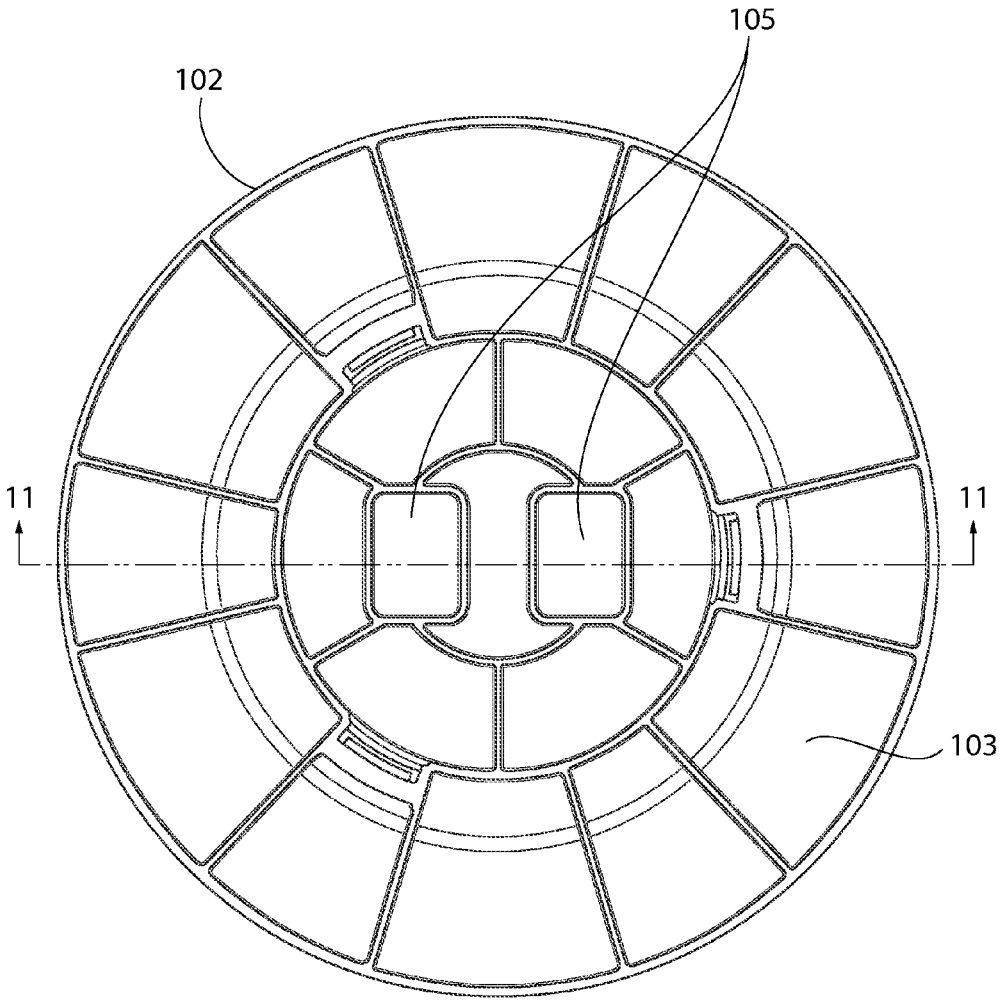

FIG. 9

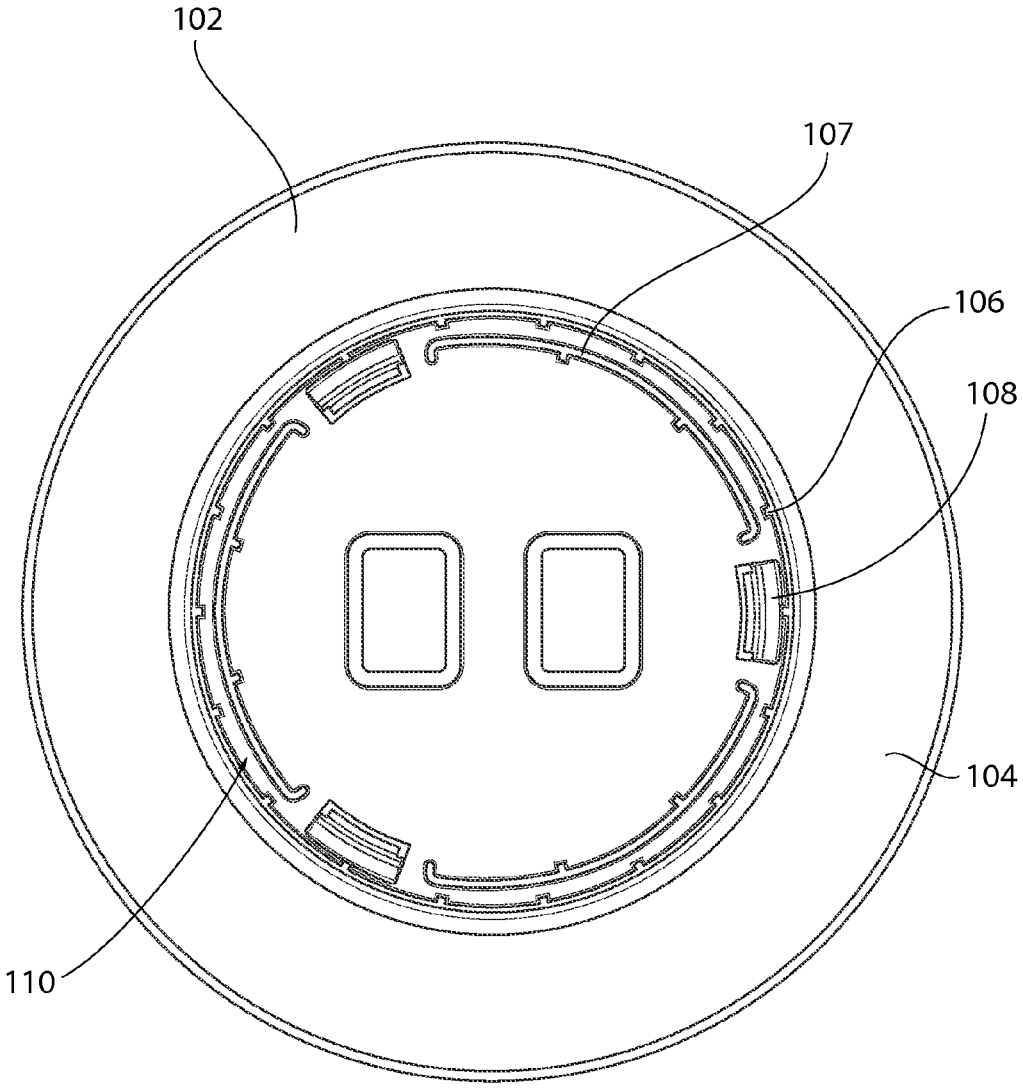

FIG. 10

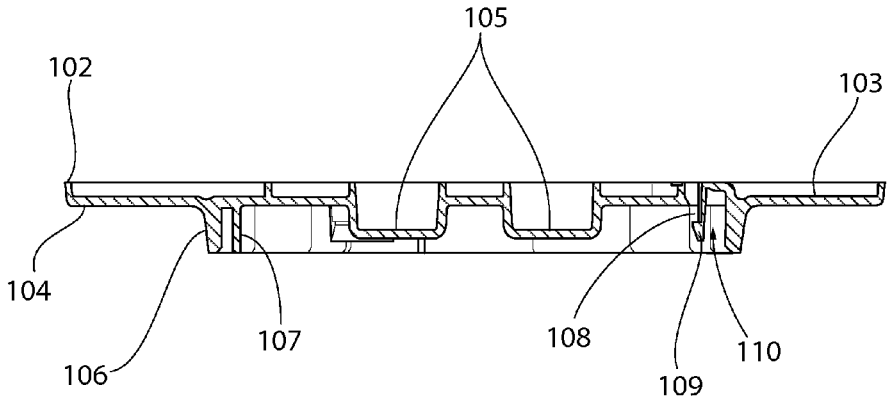

FIG. 11

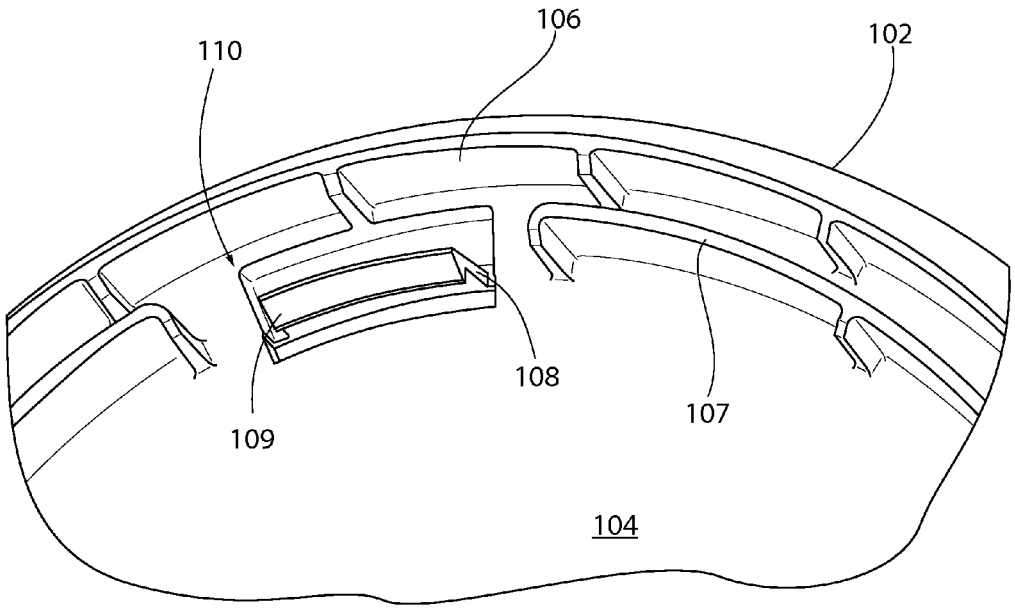

FIG. 12

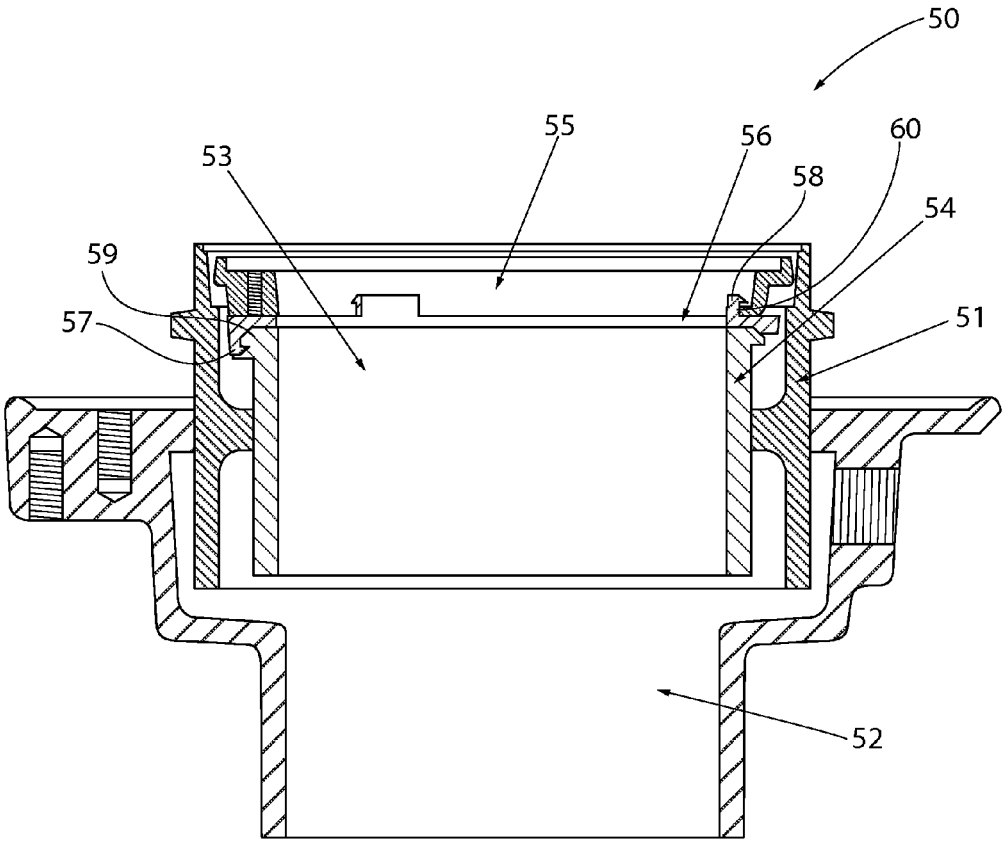

FIG. 13

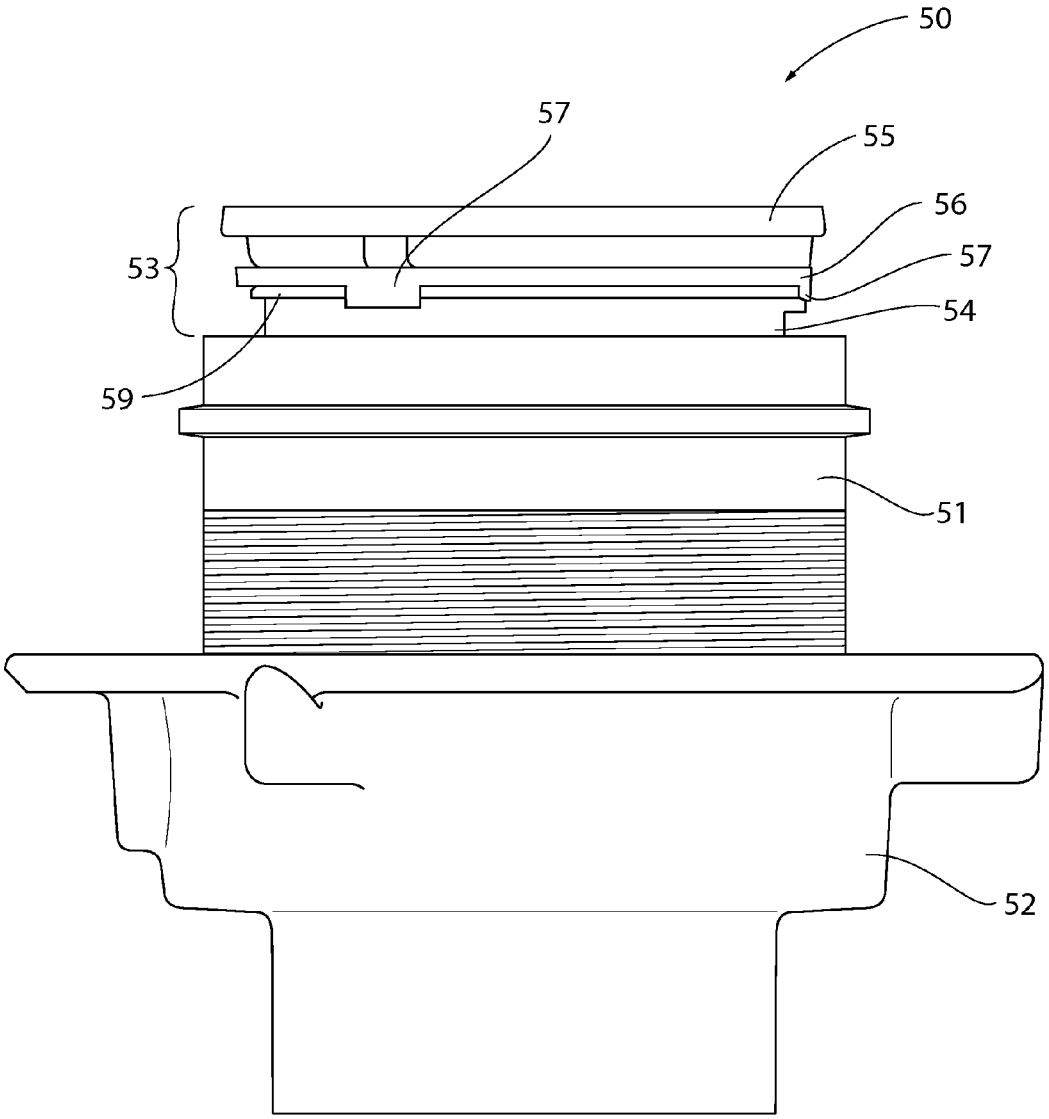

FIG. 14

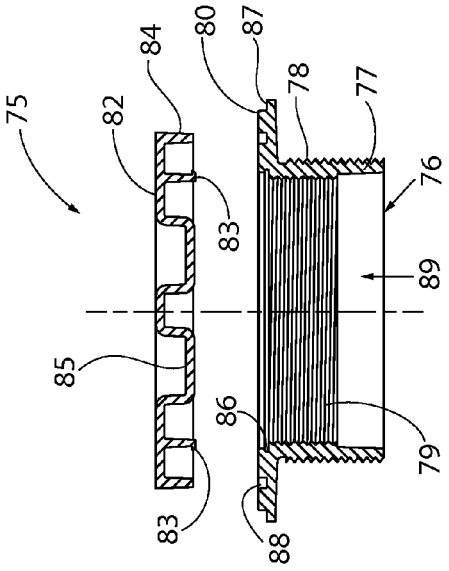

FIG. 16A

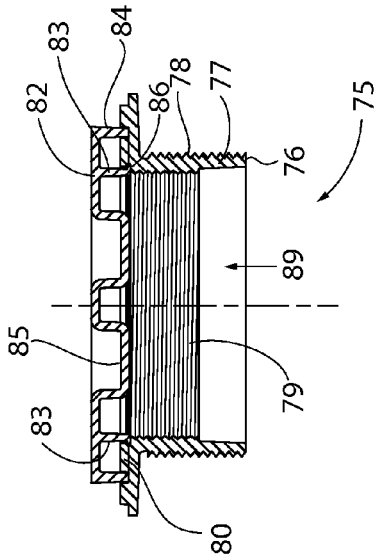

FIG. 16B

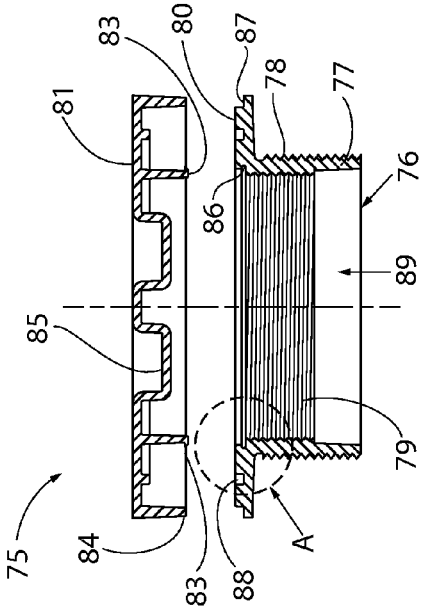

FIG. 15A

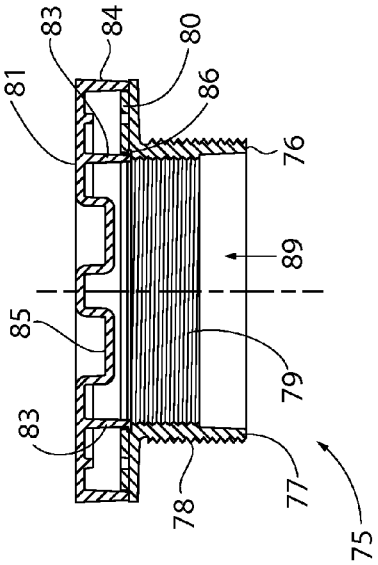

FIG. 15B

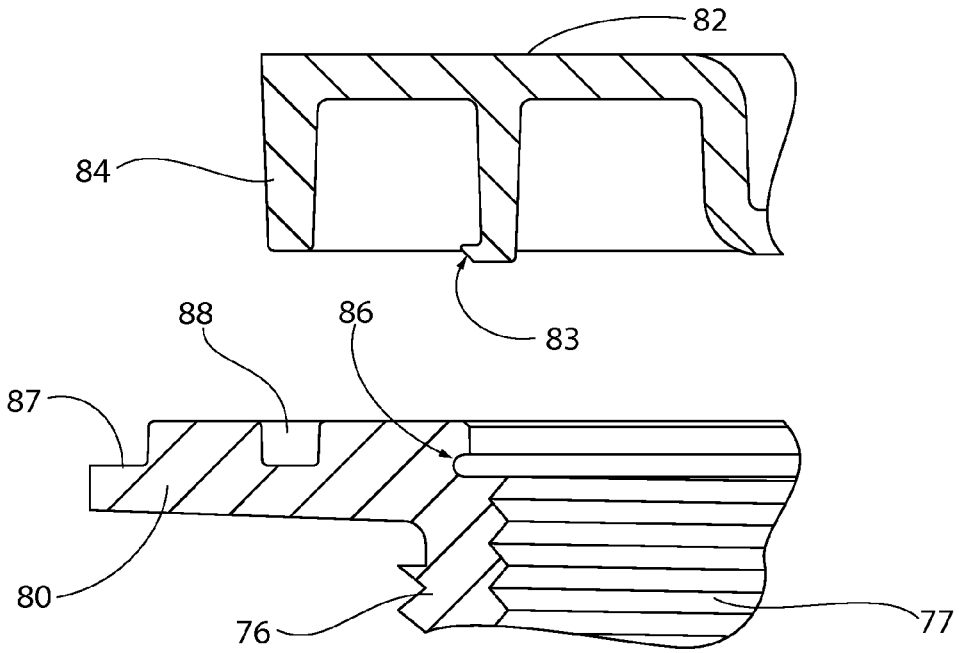

FIG. 17

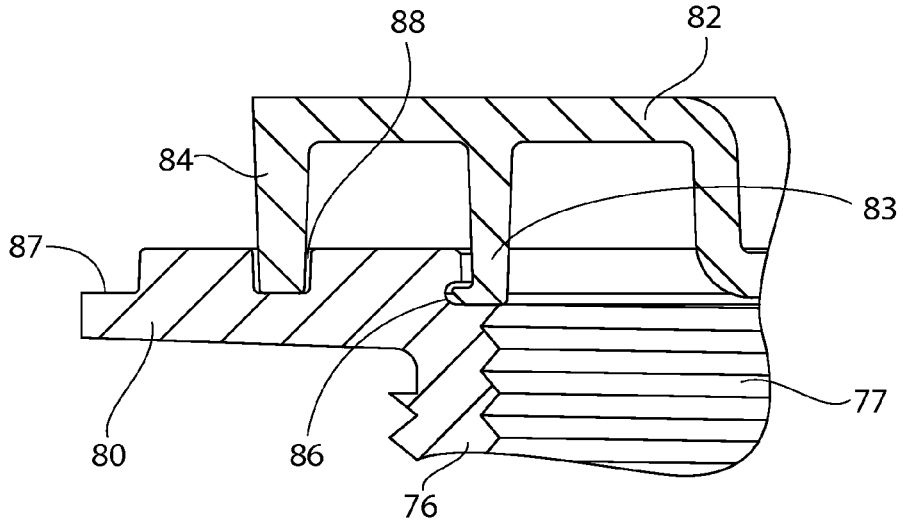

FIG. 18

ROUGH-IN ADAPTER

CROSS REFERENCE TO RELATED APPLICATIONS

The present application claims priority from U.S. Provisional Patent Application No. 61/720,447 filed on Oct. 31, 2012, and U.S. Provisional Patent Application No. 61/886,319 filed on Oct. 3, 2013, both of which are incorporated herein by reference in their entireties.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a drain assembly for installation in a finished floor surface. More particularly, the present invention relates to an adjustable drain assembly that is configured to allow for positioning of a strainer at the same level of the finished floor surface at the time of installation.

2. Description of Related Art

Typical drain assemblies or drain fixtures are installed in a finished floor surface, such as a finished concrete floor or a tiled floor, to drain water or other liquids from a top surface of the floor and allow the liquid to flow into an underlying drain pipe. Typical drain assemblies include a drain body connected to the drain pipe and a drain head connected to the drain body. The drain head may include a grate or strainer at the top thereof to prevent large pieces of debris from entering and clogging the drain pipe.

The drain head typically includes a threaded portion that is threadably attached to the drain body or directly to the drain pipe. The height of the drain head may be minimally adjusted up or down by threading the drain head further into or out of the drain body or drain pipe.

During installation, the drain body and drain head are installed upon the drain pipe prior to pouring the surrounding concrete slab that defines the primary floor surface. Ideally, the drain is installed at the proper height to allow for proper drainage and so that the strainer or grate will be positioned flush with the final floor surface, i.e., at the same level as the finished concrete flooring or with any supplemental flooring, such as tiles, installed on top of the concrete slab. Because the drain body and the drain head must be installed prior to construction of the finished flooring, the drain assembly is subject to infiltration by debris, which requires cleaning after completion of the flooring, and damage during construction.

Further, once the finished concrete slab is constructed and set, it is usually impossible to raise or lower the level of the drain head and/or strainer without removing finished concrete from the area of the drain assembly.

SUMMARY OF THE INVENTION

Accordingly, there is a general need in the art for a drain assembly that allows for a void to be created in a finished concrete slab to allow for installation of a drain head after completion of the concrete slab so that the height of the drain head can be easily adjusted both during and after installation. There is also a general need in the art for a drain head that allows for easy installation of different strainers or grates on a drain assembly during and after installation.

According to one particular embodiment of the invention, a drain assembly is provided. The drain assembly includes a drain body configured to be connected to a drain pipe such that the drain body is in fluid communication with the drain pipe; and a drain head assembly adjustably connected to the drain body such that the drain head assembly is in fluid communication with the drain body. The drain head assembly includes a shank adjustably connected to the drain body; and a strainer assembly connected to a top of the shank, the strainer assembly including a strainer, an upper frame, and a lower frame connected to each other. The lower frame includes a connection feature configured to non-threadably and removably connect the strainer assembly to the top of the shank.

According to another particular embodiment of the invention, a drain assembly is provided. The drain assembly includes a drain body configured to be connected to a drain pipe such that the drain body is in fluid communication with the drain pipe; a drain head assembly adjustably connected to the drain body such that the drain head assembly is in fluid communication with the drain body, the drain head assembly including a shank adjustably connected to the drain body; and a cover configured to be removably connected to the shank in a position over the shank and to at least partially define a void in a poured concrete slab around the shank.

According to yet another particular embodiment of the invention, a method of installing a drain assembly in a finished floor surface is provided. The method includes providing a drain assembly. The drain assembly includes a drain body; a drain head assembly adjustably connected to the drain body such that the drain head assembly is in fluid communication with the drain body, the drain head assembly including a shank and a strainer assembly configured to be connected to a top of the shank; and a cover configured to be removably connected to the shank in a position over the shank. The method further includes adjustably connecting the shank of the drain head assembly to the drain body; connecting the drain body to a drain pipe such that the drain body is in fluid communication with the drain pipe; connecting the cover to the shank in the position over the shank; adjusting a height of the cover and the shank with respect to the drain body such that the cover is positioned at a level flush with an intended height of the finished floor surface; pouring a concrete slab around the cover and over the drain body such that the cover at least partially defines a void in the poured concrete slab around the shank; removing the cover from the shank; and connecting the strainer assembly to the top of the shank.

Further details and advantages of the invention will become clear upon reading the following detailed description in conjunction with the accompanying drawing figures, wherein like parts are designated with like reference numerals throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded perspective view of a drain assembly in accordance with an embodiment of the present invention;

FIG. **2** is another exploded perspective view of the drain assembly of FIG. **1**;

FIG. **3** is an exploded view of the lower frame and the shank of the drain assembly of FIG. **1**;

FIGS. **4***a*, **4***b*, and **4***c* are a series of views illustrating the engagement between the lower frame and the shank of the drain assembly of FIG. **1**;

FIGS. **4**D-**4**M are a series of views illustrating an alternative embodiment of a lower frame of the drain assembly of FIG. **1** and illustrating the engagement between the lower frame and the shank of the drain assembly of FIG. **1**;

FIG. **5** is a perspective view of the shank and the drain body of the drain assembly of FIG. **1**;

FIG. **6** is a schematic representation illustrating the installation of the drain assembly of FIG. **1** in a finished floor surface;

FIG. **7** is a cross-sectional perspective view of a cover assembly in accordance with another embodiment of the present invention connected to the shank and drain body of the drain assembly of FIG. **1**;

FIG. **8** is a cross-sectional side view of the cover assembly of FIG. **7** connected to the shank and drain body of the drain assembly of FIG. **1**;

FIG. **8**A is a cross-sectional side view of the cover assembly of FIG. **7** according to an alternative embodiment of the present invention connected to the shank and drain body of the drain assembly of FIG. **1**;

FIG. **9** is a top view of a cover of the cover assembly of FIG. **7**;

FIG. **10** is a bottom view of the cover of the cover assembly of FIG. **7**;

FIG. **11** is a cross-sectional side view of the cover of the cover assembly of FIG. **7** taken along lines **11**-**11** shown in FIG. **9**;

FIG. **12** is an enlarged bottom perspective view of a portion of the cover of the cover assembly of FIG. **7**;

FIG. **13** is a cross-sectional side view of a drain assembly in accordance with another embodiment of the present invention;

FIG. **14** is a side view of the drain assembly of FIG. **13**;

FIGS. **15**A, **15**B, **16**A, and **16**B are cross-sectional side views of a rough-in adapter assembly in accordance with yet another embodiment of the present invention;

FIG. **17** is a detailed view of the rough-in adapter assembly of FIGS. **15**A-**16**B taken from area "A" in FIG. **15**A with the cover removed from the coring sleeve; and

FIG. **18** is a detailed view of the rough-in adapter assembly of FIGS. **15**A-**16**B taken from area "A" in FIG. **15**A with the cover positioned on the coring sleeve.

DETAILED DESCRIPTION OF THE INVENTION

For purposes of the description hereinafter, spatial orientation terms, if used, shall relate to the referenced embodiment as it is oriented in the accompanying drawing figures or otherwise described in the following detailed description. However, it is to be understood that the embodiments described hereinafter may assume many alternative variations and embodiments. It is also to be understood that the specific devices illustrated in the accompanying drawing figures and described herein are simply exemplary and should not be considered as limiting.

With reference to FIGS. **1**-**4***c* and **5**, a drain assembly **10** for installation in a finished floor surface **29** is shown in accordance with an embodiment of the present invention. As shown in FIGS. **1** and **2**, the drain assembly **10** includes a drain head assembly **11** adjustably connected to a drain body **16**. The drain head assembly **11** includes a shank **15** and a strainer assembly that includes a strainer **12**, an upper frame **13**, and a lower frame **14** connected to the shank **15**. The strainer **12** and upper frame **13** may be constructed of metal, with the strainer **12** being positioned inside the upper frame **13**. The lower frame **14** may be constructed of a plastic material. The shank **15** may be constructed from plastic or cast iron material. When assembled, the upper frame **13** will rest on the top surface of the lower frame **14**, and the strainer **12**, upper frame **13**, and lower frame **14** are secured to each other by fasteners, such as machine screws, that are inserted through the strainer **12** and the upper frame **13**, and threaded into the lower frame **14**. To that end, the lower frame **14** includes threaded holes **18** extending therethrough. The threaded holes **18** may be directly formed in the lower frame **14** or may be inserts made from a durable material, such as metal, that are molded into the lower frame **14**. As can be appreciated by one having ordinary skill in the art, the strainer **12**, upper frame **13**, and lower frame **14** may also be secured to each other by any suitable means, other than machine screws and threads.

The strainer assembly is fastened together and shipped as a single unit, and then assembled onto the drain assembly **10** during installation. It is to be appreciated that the strainer **12**, upper frame **13**, lower frame **14**, and the shank **15** may be made from any material(s) known to be suitable to those having ordinary skill in the art. Also, various configurations in the assembly of the strainer assembly are also possible. For instance, the upper frame **13** and the lower frame **14** may be combined into a single piece, with the strainer **12** fastened to the single frame piece.

As shown in FIGS. **1**-**4***c*, the lower frame **14** includes a connection feature that allows the lower frame **14** and, thus, the entire strainer assembly, to be non-threadably connected to a top end of the shank **15** to allow for easy assembly and removal of the strainer assembly from the shank **15**. In particular, the lower frame **14** includes at least two, and particularly three, equally circumferentially-spaced snap-on hooks **17** extending from a bottom surface of the lower frame **14**. The shank **15** includes at least two, and particularly three, complementary sets of lugs **19** at a top end thereof extending outward from a top ring **20** of the shank **15**. When the strainer assembly is assembled onto the shank **15**, the lower frame **14** is pressed down over the top surface of the shank **15** until the hooks **17** grab on to the top ring **20** formed at the top end of the shank **15** by bending outward and snapping over and onto the top end of the shank **15**. Each set of lugs **19** engages a respective one of the flexible hooks **17**. The lugs **19** are provided so that, when the lower frame **14** is assembled onto the threaded shank **15**, the hooks **17** may be positioned between the lugs **19** to prevent rotation of the lower frame **14** and the strainer assembly with respect to the threaded shank **15**.

Accordingly, it is to be appreciated that a variety of shapes and configurations of the strainer **12**, upper frame **13**, and lower frame **14** may be provided and used with a common or standard threaded shank **15** since the lower frame **14** is connected to the top end of the threaded shank **15** without the use of fasteners or other specialized hardware. In particular, the top flange geometry of the lower frame **14** may be molded into a plurality of sizes and configurations to accommodate a variety of strainers **12** and upper frames **13**. For instance, the lower frame **14** can be molded into various shapes, such as round or square, and into a variety of sizes to accommodate various finished assemblies of strainers **12** and upper frames **13**. Thus, the threaded shank **15** may be made standard and compatible with a variety of different configurations of the strainer assembly. Further, the threaded shank **15** may be replaced or reused without requiring replacement or reuse of a strainer assembly, and vice versa.

It is to be appreciated that the connection feature that allows for assembly of the lower frame **14** onto the threaded shank **15** may be of any configuration known to be suitable to those having ordinary skill in the art. According to an alternative embodiment of the present invention, the connection feature is a bayonet-type attachment mechanism, wherein one of the lower frame **14** or the threaded shank **15**

includes lugs that engage within a circumferential groove formed in the other of the lower frame **14** or the threaded shank **15**.

As shown in FIGS. **1**, **2**, and **5**, the drain body **16** includes a bottom outlet **21** that connects to a drain pipe (not shown), such that drain body **16** is in fluid communication with the drain pipe, and a lid **22** fastened to the outlet **21** in a standard configuration. The drain body **16** may be made from plastic or cast iron or other suitable materials. The lid **22** includes a protruding horn **23** thereon that has female threads on an inside surface thereof. The shank **15** includes external male threads on an outside surface thereof, such that the shank **15** may be threadably and adjustably connected to the drain body **16** such that the drain head assembly **11** is in fluid communication with the drain body **16** and installed to the required height with respect to the drain body **16** and the finished floor surface. It is to be appreciated that the shank **15** may be adjustably connected to the drain body **16** by suitable means other than a threaded connection. For instance, the shank **15** may be slidably connected to the drain body **16** and then locked in a vertical position by a suitable mechanism, or the shank **15** may include a plurality of notched steps that rest on lugs formed within an interior diameter of the drain body **16**.

With reference to FIGS. **4**D-**4**M, an alternative embodiment of a lower frame **14***a* is shown. The lower frame **14***a* includes six circumferentially spaced, flexible snap hooks **17***a* extending from a bottom surface of the lower frame **14***a*. The flexible snap hooks **17***a* are interspaced by circumferential walls **17***b* that also extend from the bottom surface of the lower frame **14***a*. The flexible snap hooks **17***a* are lengthened in comparison to the snap hooks **17** discussed above with reference to FIGS. **1**-**4***c* in order to provide greater flexibility. The circumferential walls **17***b* extend a similar length as the flexible snap hooks **17***a*. The provision of six snap hooks **17***a* to the lower frame **14***a* results in additional pull force resistance being provided to the lower frame **14***a*. Three of the hooks **17***a* engage the top ring **20** of the shank **15** within the lugs **19** to prevent rotation of the lower frame **14***a*, as discussed above. The other three snap hooks **17***a* engage the top ring **20** of the shank **15** for additional support.

As shown in FIGS. **4**I-**4**M, the top ring **20** of the shank **15** fits within the perimeter defined by the snap hooks **17***a* and the circumferential walls **17***b*. In this manner, the circumferential walls **17***b* are positioned to resist shear force applied to the snap hooks **17***a* that may occur during usage and prevent forces from being applied to and damaging or breaking the snap hooks **17***a*. The snap hooks **17***a* may also include reinforcement ribs to prevent breakage. Protruding bumps **14***b* may be formed in the lower frame **14***a* in order to promote making the snap hooks **17***a* with a longer length. The bumps **14***b* may be configured to have a tapered surface to prevent standing water from collecting on the lower frame **14***a*. The lower frame **14***a* is installed on the shank **15** in the same manner as discussed above with respect to the lower frame **14**. The lower frame **14***a* also includes threaded holes **18***a* to allow the upper frame **13** and strainer **12** to be fastened to the lower frame, also in the same manner as discussed above.

With reference to FIG. **6**, the drain assembly **10** is installed in the finished floor surface **29** with the aid of a rough-in cover **24**. As shown, during construction, the drain body **16** and the threaded shank **15** are connected to the drain pipe within the subflooring. The rough-in cover **24** is then positioned on the drain body **16** and over the shank **15** such that a bottom **27** of the cover **24** is in engagement with the lid **22** of the drain body **16**, and the threaded shank **15** is within an interior of the cover **24**. The cover **24** includes hooks **25** or other features extending from an interior surface **28** thereof that engages the top of the shank **15** to removably connect the cover **24** to the shank **15** in the same manner as the lower frame **14** discussed above. Thus, the threaded shank **15** and the rough-in cover **24** can be installed on to the drain body **16** and then adjusted to the required height, such that a top surface **26** of the rough-in cover **24** is positioned at a level flush with the intended height of the finished floor surface **29**. The concrete slab can then be poured around the cover **24** and over the drain body **16**, such that the cover **24** at least partially defines a void in a poured concrete slab of the finished floor surface **29** that allows for installation and adjustment of the drain head assembly **11**. In particular, because the cover **24** is positioned over and surrounds the shank **15** and extends to engage the lid **22** of the drain body **16**, the cover **24** fully defines the void. To that end, an expansible sealing material (not shown) may be provided between the bottom **27** of the cover **24** and the lid **22** of the drain body **16** to prevent infiltration of poured concrete material therebetween during the pour.

Once the concrete slab is poured and the finished floor surface **29** completed, the rough-in cover **24** can be removed from the shank **15**, which remains adjustable with respect to the drain body **16**, and the strainer assembly of the strainer **12**, upper frame **13**, and lower frame **14** can be connected to the top of the threaded shank **15** in the manner discussed above. The drain head assembly **11** can be adjusted to the proper height such that the strainer **12** is flush with the finished floor surface **29**.

With reference to FIGS. **7**-**12**, a cover assembly **100** for use as a rough-in cover is shown in accordance with another embodiment of the present invention. As shown in FIGS. **7** and **8**, the cover assembly **100** is configured to be installed on the drain body **16** to surround the shank **15** prior to pouring of the concrete slab around the drain assembly. The cover assembly **100** includes a protector sleeve **101** and a cover **102**. The cover **102** has a top surface **103** and a bottom **104**, and is configured to be positioned over the shank **15**. In particular, the cover **102** is positioned on and removably connected to the top of the shank **15**.

The protector sleeve **101** is positioned between the bottom **104** of the cover **102** and the lid **22** of the drain body **16**, and surrounding the shank **15**. The protector sleeve **101** may be made from a flexible foam material so that it becomes compressed between the cover **102** and the drain body **16** during assembly and prevents the intrusion of concrete between the cover **102** and the drain body **16** to the shank **15** while concrete is poured around the drain body **16** and the cover assembly **100**. In this manner, the cover **102** and the protector sleeve **101** in combination define a void in the poured concrete slab to allow for installation and adjustment of the drain head assembly **11**.

At least one projection **106**, **107**, **108** is disposed on the bottom **104** of the cover **102** for engaging the protector sleeve **101** to retain the position of the protector sleeve **101** and for engaging the shank **15** to removably connect the cover **102** to the shank **15**. More specifically, the bottom **104** of the cover **102** includes an outer annular projection **106** forming a ring within the outer perimeter of the cover **102**. The bottom **104** of the cover **102** also includes a plurality of inner arc-shaped projections **107** that are substantially concentric with the outer annular projection **106**, and at least two inner flexible projections **108** that are substantially aligned with the diameter of the arc-shaped projections **107** and may also be arc-shaped concentric with the inner

arc-shaped projections **107** and the outer annular projection **106**. In this manner, the inner arc-shaped projections **107** and the inner flexible projections **108** form an inner ring within the diameter of the outer ring defined by the outer annular projection **106**. The inner and outer rings define a channel **110** between them and are configured to engage the protector sleeve **101** to retain the protector sleeve **101** within the channel **110** in its position surrounding the shank **15**, and to prevent the intrusion of poured concrete to the shank **15**. The inner flexible projections **108** may include snap hooks **109** on the lower ends thereof and are configured to engage the top ring **20** of the shank **15** so that the cover **102** is removably connected to the top of the shank **15**.

During construction, the drain body **16** and the threaded shank **15** are connected to the drain pipe within the subflooring. The rough-in cover assembly **100** is then installed onto the drain body **16** and over the threaded shank **15** such that the protector sleeve **101** is retained within the channel **110** formed between the projections **106**, **107**, **108** on the bottom **104** of the cover **102** and positioned between the bottom **104** of the cover **102** and the lid **22** of the drain body **16** to surround the threaded shank **15**, and such that the cover **102** is removably connected to the threaded shank **15** via the engagement of the flexible projections **108** with snap hooks **109** and the top ring **20** of the threaded shank **15**. Thus, the threaded shank **15** and the rough-in cover assembly **100** can be installed on to the drain body **16** and then adjusted to the required height, such that the top surface **103** of the rough-in cover **102** is positioned at a level flush with the intended height of the finished floor surface. The concrete slab can then be poured around the cover assembly **100** and the drain body **16**, such that the cover assembly **100** defines a void in the finished floor surface that allows for installation and adjustment of the drain head assembly **11**.

Once the concrete slab is poured and the finished floor surface completed, the rough-in cover assembly **100** can be removed from the threaded shank **15**, which remains adjustable with respect to the drain body **16**, and the strainer assembly of the strainer **12**, upper frame **13**, and lower frame **14** can be connected to the top of the threaded shank **15** in the manner discussed above. The drain head assembly **11** can be adjusted to the proper height such that the strainer **12** is flush with the finished floor surface. The top surface **103** of the cover **102** may include a notch or recess **105** to facilitate removal of the cover **102** from the finished concrete slab.

It is to be appreciated that the configuration of the cover **102** and the projections **106**, **107**, **108** may be altered in any manner known to be suitable to one having ordinary skill in the art so as to engage and retain the protector sleeve **101** between the cover **102** and the drain body **16**, and to removably connect the cover **102** to the top of the threaded shank **15**. The cover **102** may also be configured to have additional material thickness or the thickness may be increased by applying a layer of foam to the bottom **104** of the cover **102** so as to increase the size of the void in the poured concrete slab created by the cover **102** and facilitate access to the threaded shank **15** for installation and adjustment of the drain head assembly **11**.

With reference to FIG. **8**A, an alternative embodiment of the cover assembly **100** is shown. According to this embodiment, a protector sleeve **101***a* is provided with an increased material thickness and a reduced inside diameter as compared to the protector sleeve **101** discussed above with reference to FIGS. **8** and **9-12**. As shown, the protector sleeve **101***a* is therefore wrapped tightly around the perimeter of the shank **15** to define the void in the finished concrete surface and to prevent infiltration of concrete to the threads or other connection features present on the shank **15**. The engagement of the protector sleeve **101***a* tightly wrapped around the shank **15** serves to maintain the position of the protector sleeve **101***a* on the shank **15** during installation of the drain assembly **10** and pouring of the concrete slab. The protector sleeve **101***a* is not engaged within the channel **110** formed by the projections **106**, **107**, **108** formed on the bottom **104** of the cover **102**. Instead, the protector sleeve **101***a* may be positioned on the shank **15** such that it abuts against the lowermost edges of the arc-shaped projections **107** extending from the bottom **104** of the cover **102** to prevent concrete from infiltrating to the engagement between the snap hooks **109** of the flexible projections **108** and the top ring **20** of the shank **15**.

With reference to FIGS. **1-12**, according to one embodiment of the invention, a method of installing a drain assembly **10** in a finished floor surface **29** includes providing the drain assembly **10** described above with reference to FIGS. **1-12**; adjustably connecting the shank **15** of the drain head assembly **11** to the drain body **16**; connecting the drain body **16** to a drain pipe such that the drain body **16** is in fluid communication with the drain pipe; connecting the cover **24**, **102** to the shank **15** in the position over the shank **15**; adjusting a height of the cover **24**, **102** and the shank **15** with respect to the drain body **16** such that the cover **24**, **102** is positioned at a level flush with an intended height of the finished floor surface **29**; pouring a concrete slab around the cover **24**, **102** and over the drain body **16** such the cover **24**, **102** at least partially defines a void in the poured concrete slab around the shank **15**; removing the cover **24**, **102** from the shank **15**; and connecting the strainer assembly to the top of the shank **15**. The method may further include providing a protector sleeve **101** and positioning the protector sleeve **101** between a bottom **104** of the cover **102** and the drain body **16**, and surrounding the shank **15**. The method may also further include adjusting the drain head assembly **11** such that a top of the strainer assembly is flush with the finished floor surface **29**.

With reference to FIGS. **13** and **14**, a drain assembly **50** for installation in a floor surface according to another embodiment of the present invention is shown. The drain assembly **50** includes a rough-in adapter **51** having an exterior surface with male threading that is threadably connected to an interior female threaded surface of a drain body **52**, such that the rough-in adapter **51** is adjustably connected to the drain body **52**. The rough-in adapter **51** also includes an interior surface with female threading that accepts a drain head assembly **53**, such that the drain head assembly **53** is adjustably connected to the rough-in adapter **51**.

The drain head assembly **53** includes a threaded shank **54**, a frame **55**, and a plastic snap ring/lower frame **56**. The frame **55** receives a strainer (not shown) that covers the drain opening. The frame **55** includes a bottom flange **60** and the snap ring **56** includes at least two circumferentially-spaced flexible hooks **58** extending from a top surface thereof that engage the bottom flange **60** of the frame **55** by snapping on to the bottom flange **60** to connect the frame **55** to the snap ring **56**. Similarly, the threaded shank **54** includes a top flange **59** and the snap ring **56** includes a plurality of circumferentially-spaced hooks **57** extending from a bottom surface thereof that snap on to the top flange **59** to connect the snap ring **56** to the top of the threaded shank **54**. Thus, the frame **55** and strainer can be connected to the threaded shank **54** by the snap ring **56** in a manner similar to the

connection between the strainer assembly and the threaded shank **15** discussed above with respect to the embodiment shown in FIGS. **1-6**.

The rough-in adapter **51** may also be provided with a cover (not shown) that fits within the top of the adapter **51**, like a plug, or over the adapter **51** similar to the rough-in cover **24** discussed above with reference to FIG. **6**. The cover prevents infiltration of concrete into the rough-in adapter **51** during the pour and defines a void in the finished floor surface to allow for installation and adjustment of the drain head assembly **53**. In particular, during installation, the rough-in adapter **51** and drain body **52** are secured to a drain pipe (not shown) installed within the subflooring. The height of the rough-in adapter **51** is then adjusted with respect to the drain body **52** such that the cover is at a position flush with the intended level of the poured concrete slab. The concrete is then poured around the drain body **52** and the rough-in adapter **51** to the intended level such that the rough-in adapter **51** at least partially defines a void in the poured concrete slab suitable for installation of the drain head assembly **53**. When the concrete slab is finished, the cover is removed from the rough-in adapter **51** and the drain head assembly **53** is installed such that the strainer is positioned at a level flush with the finished floor surface.

With reference to FIGS. **15A-18**, a rough-in adapter assembly **75** for use in the installation of a drain assembly in a finished floor surface in accordance with another embodiment of the present invention is shown. The rough-in adapter assembly **75** includes a coring sleeve **76** having a lower stem **77** and a top flange **80** extending outwardly from the lower stem **77**. A central opening **89** extends through the coring sleeve **76** from the top flange **80** to the bottom of the lower stem **77**. The lower stem **77** includes male threads **78** on an exterior surface to allow for the coring sleeve **76** to be adjustably connected to a drain body (not shown) or drain pipe (not shown), and female threads **79** on an interior surface to allow for a drain head assembly (not shown) to be adjustably connected to the coring sleeve **76** within the central opening **89** to place the drain head assembly in communication with the drain body and/or drain pipe.

The rough-in adapter assembly **75** also includes a cover **81**, **82**. According to the embodiment shown in FIGS. **15A-18**, the top flange **80** of the coring sleeve **76** is configured to engage a 6" cover **81** (FIGS. **15A** & **15B**) or a 5" cover **82** (FIGS. **16A** & **16B**), depending on the size of the drain assembly to be used with the coring sleeve **76**. The cover **81**, **82** includes a plurality of non-continuous circumferentially-spaced legs **83** extending downward from an inside surface of the top of the cover **81**, **82**. According to a particular embodiment, the cover **81**, **82** includes six equally spaced legs **83**. The legs **83** each include a projection formed at an end thereof in the form of a hook or tooth that is configured to snap into a groove **86** formed in the top flange **80** of the coring sleeve **76** at the mouth of the central opening **89** to releasably secure the cover **81**, **82** to the coring sleeve **76**. An outside rim **84** of the cover **81**, **82** fits within a complementary annular recess **87**, **88** formed in the top flange **80** of the coring sleeve **76** when the cover **81**, **82** is secured to the coring sleeve **76**.

During installation, the rough-in adapter assembly **75** is threadably secured to the drain body and/or the drain pipe installed within the subflooring. The height of the rough-in adapter assembly **75** is then adjusted such that the top surface of the cover **81**, **82** is at a position flush with the intended level of the poured concrete slab. The concrete is then poured around the rough-in adapter assembly **75** to the intended level, with the top flange **80** and the cover **81**, **82** in combination defining a void in the concrete slab to allow for installation and adjustment of a drain head assembly. When the concrete slab is finished, the cover **81**, **82** is removed from the coring sleeve **76** and the drain head assembly is installed, such that the strainer is positioned at a level flush with the finished floor surface. The top surface of the cover **81**, **82** may include a notch or recess **85** to facilitate removal of the cover **81**, **82** from the finished concrete slab.

While specific embodiments of the invention have been described in detail, it will be appreciated by those skilled in the art that various modifications and alternatives to those details could be developed in light of the overall teachings of the disclosure. The presently preferred embodiments described herein are meant to be illustrative only and not limiting as to the scope of the invention, which is to be given the full breadth of the appended claims and any and all equivalents thereof.

The invention claimed is:

1. A drain assembly, comprising:

a drain body configured to be connected to a drain pipe such that the drain body is in fluid communication with the drain pipe; and

a drain head assembly adjustably connected to the drain body such that the drain head assembly is in fluid communication with the drain body, the drain head assembly comprising:

a shank adjustably connected to the drain body; and

a strainer assembly connected to a top of the shank, the strainer assembly including a strainer, an upper frame, and a lower frame connected to each other,

wherein the lower frame includes a connection feature configured to non-threadably and removably connect the strainer assembly to the top of the shank and the shank of the drain head assembly is located in the drain body;

wherein the connection feature of the lower frame includes at least two flexible hooks extending from a bottom of the lower frame and configured to engage the top of the shank; and

wherein the lower frame includes at least two flexible hooks extending from a top of the lower frame and the upper frame includes a bottom flange, the lower frame being connected to the upper frame by an engagement between the flexible hooks extending from the top of the lower frame and the bottom flange of the upper frame.

2. The drain assembly according to claim **1**, wherein the shank includes external threads and is threadably connected to the drain body.

3. The drain assembly according to claim **1**, wherein the at least two flexible hooks extending from the bottom of the lower frame comprise six flexible hooks equally circumferentially-spaced around the lower frame.

4. The drain assembly according to claim **1**, wherein the shank includes a top ring at the top of the shank, the top ring of the shank being configured to be engaged by the flexible hooks extending from the bottom on the lower frame.

5. The drain assembly according to claim **4**, wherein the top of the shank includes at least two sets of lugs extending outward from the top ring, each of the at least two sets of lugs being configured to engage a respective one of the at least two flexible hooks extending from the bottom on the lower frame to prevent rotation of the strainer assembly with respect to the shank.

6. The drain assembly according to claim 1, wherein the strainer, upper frame, and lower frame are connected by fasteners engaging the strainer, upper frame, and the lower frame.

7. The drain assembly according to claim 1, further comprising a rough-in adapter adjustably connected to the drain body,

wherein the shank of the drain head assembly is adjustably connected to the rough-in adapter, and

wherein the rough-in adapter is configured to at least partially define a void in a poured concrete slab.

8. The drain assembly according to claim 7, further comprising a removable cover positioned on the rough-in adapter and the removable cover and the rough-in adapter in combination are configured to define the void in the poured concrete slab.

9. The drain assembly according to claim 8, wherein the cover includes internal hooks for removably connecting the cover to the shank.

10. The drain assembly according to claim 1, further comprising:

a cover configured to be positioned on the drain body over the shank to at least partially define a void in a poured concrete slab around the shank, the cover being configured to be removably connected to the shank.

11. A drain assembly, comprising:

a drain body configured to be connected to a drain pipe such that the drain body is in fluid communication with the drain pipe;

a drain head assembly adjustably connected to the drain body such that the drain head assembly is in fluid communication with the drain body, the drain head assembly including a shank adjustably connected to the drain body in which the shank is located;

a cover configured to be removably connected to the shank in a position over the shank and to at least partially define a void in a poured concrete slab around the shank; and

a protector sleeve configured to be positioned between a bottom of the cover and the drain body and surrounding the shank;

wherein the cover includes at least one projection on the bottom of the cover;

wherein the cover and the protector sleeve in combination are configured to define the void in the poured concrete slab, and the at least one projection on the bottom of the cover is configured to engage the shank to removably connect the cover to the shank;

wherein the at least one projection on the bottom of the cover includes an outer annular projection forming an outer ring within a perimeter of the cover, a plurality of inner arc-shaped projections concentric with the outer annular projection, and at least two inner flexible projections circumferentially aligned with the inner arc-shaped projections configured to engage the shank to removably connect the cover with the shank;

wherein the inner arc-shaped projections and the at least two inner flexible projections form an inner ring within a diameter of the outer ring formed by the outer annular projection to define a channel between the inner and outer rings; and

wherein the inner and outer rings are configured to engage and retain the protector sleeve within the channel.

12. The drain assembly according to claim 11, wherein the cover is configured to be positioned on the drain body over the shank and includes internal hooks for removably connecting the cover to the shank.

13. The drain assembly according to claim 11, wherein the at least two inner flexible projections include snap hooks configured to engage a top ring of the shank.

14. The drain assembly according to claim 11, wherein the drain head assembly further includes a strainer assembly removably connected to a top of the shank, the strainer assembly including a strainer, an upper frame, and a lower frame connected to each other, and

wherein the lower frame includes a connection feature configured to non-threadably and removably connect the strainer assembly to the top of the shank.

15. The drain assembly of claim 11, wherein the cover is impenetrable by concrete and lacks openings.

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